ARNOGLOSSUM ALBUM (ASTERACEAE): NEW SPECIES FROM NORTHERN FLORIDA

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ABSTRACT

The new species *Arnoglossum album* is described. Its phyllaries have prominently winged keels—a feature shared with *A. diversifolium*, *A. floridanum*, *A. plantagineum*, and *A. sulcatum*. Comparisons among members of this closely knit assemblage include morphology, phenology, ecological setting, and range, and a key is provided to distinguish the species.

RESUMEN

Se describe una especie nueva *Arnoglossum album*. Sus filarios tienen quillas aladas prominentes—una característica que comparte con *A. diversifolium*, *A. floridanum*, *A. plantagineum*, y *A. sulcatum*. Las comparaciones entre miembros de este conjunto fuertemente reticulado incluye morfología, fenología, características ecológicas y areal. Se ofrece una clave para diferenciar las especies.

Species of the tussilaginoid *Arnoglossum*, commonly called "Indian Plantains," were formerly placed in the heterogeneous "*Cacalia*" (Kral & Godfrey 1958; Cronquist 1978; Pippen 1978), but, because *Cacalia* is now typified by a species of the senecionoid European genus "*Adenostyles*" and because generic circumscriptions are now more narrowly drawn, *Arnoglossum* is considered distinct by many recent authors (Robinson 1974, 1980; Jeffrey 1979, 1992; Godfrey & Wooten 1981; Wetter 1983; Funk 1985; Brummitt 1992). *Arnoglossum* has three species with extensive ranges in the eastern United States [*A. atriplicifolium* (L.) H. Robins. and *A. reniforme* (Hook.) H. Robins.] or southeastern United States [*A. ovatum* (Walt.) H. Robins.] and one from the central part of the country [*A. plantagineum* Raf.]. The remaining three species have more limited ranges, one as a Florida endemic [*A. floridanum* (A. Gray) H. Robins.] and the others with ranges barely extending from Florida into neighboring states [*A. diversifolium* (Torr. & A. Gray) H. Robins. and *A. sulcatum* (Fern.) H. Robins.]. The latter four species (i.e., *A. plantagineum* and "the Florida group") are similar in having phyllaries with keels that are strongly winged. The new species described below is now added to this assemblage with winged phyllaries.

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MATERIALS AND METHODS

Fresh and dried materials were processed as described by Anderson (1994). Heads from at least five different collections per species were dissected and measured for involucral and floral quantitative data. Living plants of the five species under study were propagated from seed or as transplants in a greenhouse or common garden in Tallahassee, Florida. Vouchers of seedlings, plants at various stages of development, and all cited specimens are deposited at FSU unless noted otherwise.

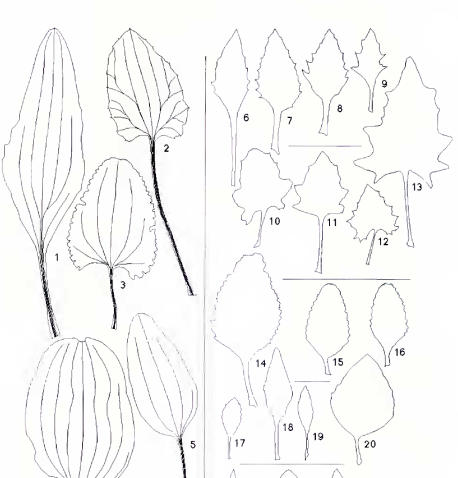
SPECIES DESCRIPTION

Arnoglossum album L.C. Anderson, sp. nov. (**Figs. 1, 6–9**). TYPE: U.S.A. FLORIDA. BAY CO.: locally common in acidic, poorly drained sandy soil of open, wet savanna with *Sarracenia flava*, *Rhynchospora*, *Rhexia*, and *Polygala* spp. just E of Rte 77 on N side of Southport, T2S, R14W, NE1/4 of SE1/4 Sec 21, 6 Jun 1995, *L.C. Anderson 15555* (HOLOTYPE: NY!; ISOTYPES: BRIT! FSU! MO! US!).

Herbae perennes plerumque 8–10 dm alta. Folia basalia 20–63 cm longa, 5–16 cm lata, longe petiolata, laminis late ovatis vel anguste oblongo-lanceolatis, vernis lateralibus principalibus per 2–4 cm supra basin laminae ad venam mediam arcte parallelis dein divergentibus. Folia caulina pauca, 7–26 cm longa, petiolata, serrata, foliis superioribus reductis sessilibusque. Capitula in cymis corymbosis disposita, involucris 10–13.4 mm longis, phyllariis albis carinis prominenter alatis. Corollae albae, 9–10.5 mm longae.

Essentially glabrous cespitose herbs. Stems (5–)8–10(–10.5) dm tall, light green, strongly ridged. Basal (radical) leaves (20–)30–55(–63) cm long overall, 5–10(–16) cm wide, long petiolate, (10–)15–18(–34) cm, blades broadly ovate to narrowly oblong-lanceolate, margins entire, shallowly sinuate, or rarely serrulate-denticulate, bases attenuate, apices rounded, mucronulate, basally disposed lateral veins appressed to the midrib 2–4 cm then abruptly extending toward the leaf margins; cauline leaves few, blades (7–)12–18(–26) cm long overall, (2.5–)4–5(–6) cm wide, petioles (1–)4–5(–12) cm long, ovate, bases cuneate, apices acuminate, serrately toothed, upper leaves reduced in size and sessile. Inflorescence compound, freely branched, ± flat-topped, with heads crowded in corymbose cymes. Heads 5-flowered; involucres 10–12.5(–13.4) mm long, cylindric, phyllaries 5, chalky white, margins hyaline, keels prominently winged (the wings rising 1–1.5(–2.0) mm from the phyllaries with margins sinuate to erose and reduced apically). Receptacles with short central cusp. Corollas white, rarely tinged with pink, 9–10.5 mm long, veins 10, tube 5–6.4 mm, throat 0.2–1.0 mm, lobes 2.9–3.8 mm, lanceolate; anthers 2.5–2.6 mm long, collars cylindrical; styles 11.8–12.5 mm long, style branches 1.5–1.7 mm long, stylopodium immersed in nectary; achenes glabrous, 4.2–5 mm long, cylindric to narrowly clavate, carpopodium cells erect, pappus white, 6–7 mm long. $n = 25$.

Distribution.—Endemic to Bay and Gulf counties of Florida in poorly



FIGS. 1–24. Representative leaves of selected *Arnoglossum* species, all at 1/6 full size. Figs. 1–5. Radical leaves showing major venation. Fig. 1. *A. album* with appressed lateral veins, *Anderson 15600*, Bay Co., FL. Fig. 2. *A. diversifolium*, *Anderson 13414*, Levy Co., FL. Fig. 3. *A. floridanum*, *Anderson 12165*, Taylor Co., FL. Fig. 4. *A. plantagineum*, *Anderson 12166*, Riley Co., KS. Fig. 5. *A. sulcatum*, *Anderson 16035*, Santa Rosa Co., FL. Figs. 6–24. Outlines of cauline leaves (major venation similar to respective radical leaves). Figs. 6–9. *A. album*. Fig. 6. *Anderson 12137*, Gulf Co., FL. Figs. 7–8. *Anderson 15600*, Bay Co., FL. Fig. 9. *Anderson 13432*, Gulf Co., FL. Figs. 10–13. *A. diversifolium*. Fig. 10. *Anderson 13475*, Levy Co., FL. Figs. 11, 13. *Anderson 13478*, Putnam Co., FL. Fig. 12. *McDaniel 9059*, Houston Co., AL. Figs. 14–15. *A. floridanum*. Fig. 14. *Anderson 12160*, Taylor Co., FL. Figs. 15–16. *Anderson 12077*, Clay Co., FL. Figs. 17–20. *A. plantagineum*. Fig. 17. *Mehrhoff 12299* (CONN), Bruce Co., Ontario Prov., Canada. Fig. 18. *Anderson 11991*, Lowndes Co., AL. Fig. 19. *Bryson 9861*, Oktibbeha Co., MS. Fig. 20. *Anderson 11968*, Tangipohoa Par., LA. Figs. 21–24. *A. sulcatum*. Fig. 21. *McDaniel 7978*, Geneva Co., AL. Fig. 22. *Anderson 12342*, Leon Co., FL. Fig. 23. *Anderson 16058*, Walton Co., FL. Fig. 24. *Anderson 16057*, Walton Co., FL.

drained, acidic (pH 5–6), loamy sands (with 0.35–1.7% organic matter) of wet savannas, open pinewoods, and most frequently the ecotone between the two, often in close association with several of the following: *Aletris lutea*, *Aristida beyrichiana*, *Asclepias longifolia*, *A. michauxii*, *A. viridula*, *Aster eryngiifolius*, *Cleistes bifaria*, *Drosera capillaris*, *Eriocaulon compressum*, *Hypericum gymnanthum*, *Lachnanthes caroliniana*, *Lachnocaulon anceps*, *Lobelia floridana*, *Ludwigia linifolia*, *L. microcarpa*, *L. virgata*, *Marshallia tenuifolia*, *Oxypolis greenmanii*, *Panicum rigidulum*, *Physostegia godfreyi*, *Platanthera nivea*, *Polygala balduinii*, *P. cruciata*, *P. ramosa*, *Rhexia lutea*, *Rhynchospora ciliaris*, *R. curtisii*, *R. fascicularis*, *R. filifolia*, *R. globularis*, *R. oligantha*, *R. pusilla*, *R. rariflora*, *R. wrightiana*, *Rudbeckia graminifolia*, *Ruellia noctiflora*, *Sabatia bartramii*, *S. campanulata*, *Sarracenia flava*, *Scutellaria floridana*, *Tofieldia racemosa*, *Verbesina chapmanii*, *Xyris ambigua*, *X. baldwiniana*, and *X. elliotii*. The woody associates (less frequent) include: *Cyrilla racemiflora*, *Hypericum cistifolium*, *H. exile*, *H. reductum*, *Ilex coriacea*, *I. vomitoria*, *Magnolia virginiana*, *Myrica cerifera*, *Nyssa ursina*, and *Pinus elliottii*. Flowers June to mid-July.

Representative specimens examined. U.S.A. **FLORIDA. Bay Co.:** type locality, *L.C. Anderson 15529* (FSU), 20 Jun 1995, *L.C. Anderson 15600* (FSU, MO, NY), 20 Jun 1995, *L.C. Anderson 15601* (FSU), *L.C. Anderson 15708* (FSU); S side County Rd 2300, 1.9 mi W of Rte 77, 1.5 air mi NW of Southport, 13 Jun 1995, *L.C. Anderson 15577* (FSU); 0.5 mi E of Burnt Mills Creek bridge on S side of Rte 388, 1.9 mi W of Rte 77, 1.5 air mi WNW of Southport, 13 Jun 1995, *L.C. Anderson 15581* (FSU). **Gulf Co.:** 5.3 mi S of Rte 22 on E side of Daniels Rd near Wetappo Creek, ca. 5.5 air mi WSW of Wewa- hitchka, *L.C. Anderson 11642* (FSU), *L.C. Anderson 11673* (2), *L.C. Anderson 11934* (FSU), *L.C. Anderson 12137* (BRIT, FSU, GH, MO, NY, US), *L.C. Anderson 12138* (FSU), *L.C. Anderson 13421* (FSU), 5.2 mi S of Rte 22 on W side Daniels Rd, *L.C. Anderson 11950* (FSU), *L.C. Anderson 12171* (FSU).

DISCUSSION

The Indian plantains with winged phyllaries form a closely related alliance of species. They differ from each other in several floral features as summarized in Table 1. The longest involucres occur in *A. floridanum*, and the shortest in *A. sulcatum*. Phyllaries in *A. album* have prominent wings proximally that become highly reduced apically, whereas in all other species the wings are shorter in height but ± equally developed for the length of the bract (often broadest apically). *Arnoglossum album* also has the whitest phyllaries; in the other species they are more greenish-white.

Corollas of *A. album* are white, rarely tinged with pink; in the other species they are white, light lavender, or ochroleucous (more greenish-white or yellowish-white in *A. floridanum* and sometimes more pinkish in *A. diversifolium*). Corollas are generally longest in *A. floridanum* and shortest in *A. sulcatum*, but not as short as reported by Pippen (1978) and Cronquist (1980). In all species the corolla tubes are relatively long and the throats below the lobes

TABLE 1. Size floral features (in mm) of "winged" *Arnoglossum* species.

Taxon	Involucre length	Corolla length	Tube width	Lobe length
A. album	10.0–13.4	9.0–10.5	0.9–1.0	2.9–3.8
A. diversifolium	10.2–11.0	9.1–10.2	0.8–0.9	3.1–3.5
A. floridanum	11.0–14.8	9.8–12.2	0.8–0.9	2.8–4.1
A. plantagineum	9.8–12.8	9.2–11.4	0.7–0.8	3.1–3.6
A. sulcatum	8.5–9.9	7.8–9.6	0.6–0.7	2.7–3.4

very short. The tube widths are greatest in *A. album* and most slender in *A. sulcatum*. Carpopodial cells of the achenes in *A. album* are generally erect, whereas they are procumbent in *A. plantagineum*. Cell shape varies somewhat within a given population because of differing stages of achene maturity. Robinson and Brettell (1973) suggested carpopodial structure was an excellent character for distinguishing genera in the Senecioneae; they recorded procumbent carpopodial cells for *Mesadenia* (i.e., *Arnoglossum*). Wetter (1983) found considerable variation in this and other micromorphological characters and questioned their value as generic markers.

Vegetatively, *A. album* looks most like *A. plantagineum*, and that species is probably its closest relative. The two differ in seedling morphology. Cotyledons of *A. album* are 1–1.5 cm long and 9–12 mm wide (± orbicular), whereas they are 3–4.5 cm long and 8–9 mm wide (spatulate-oblanceolate) in *A. plantagineum*.

The five species differ more in leaf morphology than they do in floral features (Figs. 1–24). Basal leaves of *A. album* have distinctive venation. The principal lateral veins are appressed and closely parallel the midvein into the blade for a few centimeters and then spread abruptly toward the leaf margins (Fig. 1). This feature of appressed lateral veins is also found in the related *Yermo xanthocephalus* of Wyoming. In the other *Arnoglossum* species, the lateral veins spread immediately at the base of the blade (Figs. 2–5).

Relative length of the petiole on radical leaves is often used in keys to the species (Kral & Godfrey 1958; Pippen 1978; Cronquist 1980). This feature is correlated to habitat preferences of the species. Generally, *A. diversifolium* and *A. sulcatum* grow in deep shade, and their radical leaves have long petioles (Figs. 2, 5). *Arnoglossum floridanum* usually grows in full sun, and its radical leaves have short petioles (Fig. 3). Petiole lengths are more variable in radical leaves of *A. album* and *A. plantagineum*. These two species often grow in savannas or prairies. Their petiole lengths are related to the density of grass and other vegetation near the plants; plants from the same seed source that were grown in different shade or vegetation densities in my garden produced short-petioled leaves in sunnier or less crowded situations and longer petioles in shaded or crowded conditions.

Cauline leaves of *A. diversifolium* (Figs. 10–13) are petiolate and basally truncated or cordate; they are petiolate and rounded to broadly cuneate in *A. album* (Figs. 6–9), *A. floridanum* (Figs. 14–16), and *A. plantagineum* (Figs. 17–20), whereas they are ± sessile and more narrowly cuneate in *A. sulcatum* (Figs. 21–24). Cauline leaves of *A. diversifolium* are deltoid-hastate in outline and dentately toothed. They tend to be ovate, serrately lobed, and acute in *A. album*; ovate-oblong, crenulate, and obtuse or rounded in *A. floridanum*; ovate to lanceolate or narrowly spatulate, entire or serrulate, and acute in *A. plantagineum*; and ovate to rhombic or narrowly lanceolate, sparsely serrate-dentate, and acute to obtuse in *A. sulcatum*.

Arnoglossum plantagineum has the greatest geographical range among the five species (east Texas, Louisiana, and the black soil belt of Alabama north through Kansas and Ohio to southern Minnesota, Michigan, and Ontario, Canada); it occurs mainly in calcareous, tall-grass prairie (Pippen & Chapman 1986), but minor habitats include glades, fens, and pine-oak woodlands. *Arnoglossum floridanum* occurs in well-drained sands in open pine-scrub oak, dry flatwoods, and old fields from Duval and Madison through peninsular Florida south to Highlands and Manatee counties.

The other three species occur mainly in the Florida panhandle. *Arnoglossum diversifolium* occurs in river swamps and wet hammocks and is the most wide-ranging of these three; it has a few populations in southern Alabama and southwestern Georgia, ranges from Walton County to Leon County in the panhandle, and has disjunct populations in Putnam, Volusia, and Levy counties, Florida. *Arnoglossum sulcatum* occupies shaded acid bogs or swamps; it occurs sporadically in extreme southern Alabama and southwestern Georgia and from Escambia to Leon Counties of the Florida panhandle. *Arnoglossum album* is restricted to Bay and Gulf Counties of the Florida panhandle; the only other species of the group that occurs in those counties is *A. sulcatum*, but it has different habitat preferences and phenology.

Flowering time in *Arnoglossum plantagineum* is clinal from south to north; the plants blooming in late April in southern Louisiana to early August in Minnesota and Michigan (Pippen & Chapman 1986). A reverse cline exists for *A. diversifolium*; it blooms in the Florida panhandle from May to early July (same period for *A. floridanum*), whereas, to the south, in Levy County (where it is sympatric with *Hasteola robertiorum*) *A. diversifolium* blooms from mid-August through September. *Arnoglossum album* blooms from June to mid-July, and *A. sulcatum* is the latest to bloom (September to October).

The new species, *A. album*, is distinguished from all of its immediate relatives by the following features: it is geographically isolated from all other species except *A. sulcatum*, and it is totally separated from *A. sulcatum* by

habitat and phenology; basal leaf venation is distinctive; cauline leaves are most similar to those of *A. sulcatum*, but they are generally narrower and sessile in *A. sulcatum*; its involucres and corollas appear whiter than those of the other species; the wings of the phyllaries are higher proximally and attenuated and distally, whereas wings are lower in height overall and evenly raised along the keel or somewhat higher distally in the others; the phyllary wings have erose margins distally in *A. album*, and wing margins are entire or sinuate in the other species; and the corolla tubes are wider than those in any other species in the group.

KEY TO THE FIVE SPECIES OF *ARNOGLOSSUM* WITH WINGED PHYLLARIES

Most keys to species of *Arnoglossum* include significant habitat and phenological data. The following key uses only morphological features.

1. Blades of radical leaves truncate, ovate to cordate-ovate, sparsely denticulate; lower cauline leaves deltoid-hastate, dentately toothed..... **A. diversifolium**
1. Blades of radical leaves ovate to ovate-oblong, entire, sinuate or crenate; lower cauline leaves ovate, entire, crenulate or serrately toothed.
   2. Phyllaries with prominently winged keels, wings highest at base, erose; radical leaves with lateral veins appressed to midveins for 2–4 cm then spreading. .....**A. album**
   2. Phyllaries with keels ± evenly winged throughout or highest apically, entire or sinuate; radical leaves with lateral veins diverging from base of blade.
      3. Involucres and corollas mostly over 11 mm and 10 mm long, respectively; cauline leaves ctenulate. .....**A. floridanum**
      3. Involucres and corollas mostly shorter; leaves entire or sparsely serrulate.
         4. Involucres mostly over 10 mm long, corollas over 9 mm; cauline leaves at midstem rounded to petiolate base. .....**A. plantagineum**
         4. Involucres less than 10 mm long, corollas 8–9(–9.6) mm; cauline leaves at midstem broadly cuneate and sessile.....**A. sulcatum**

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